in Strabismus." In November of the same year he was elected a Fellow of the Royal College of Surgeons of Edinburgh. Two years later, the same College granted him a licence to teach anatomy in the Edinburgh extra-mural School of Medicine, and from that time to his retirement in 1889, he was continuously engaged in teaching anatomy by lectures and in the dissecting room.

In 1863, on the death of Prof. Alexander Lizars, he was appointed by the Crown to the chair of Anatomy in the University of Aberdeen, an office which he held for twenty-six years.

During the early years of his teaching in Edinburgh, where he was preparing himself for the professorial position which he subsequently attained, he proved to be a hard-working and laborious teacher. Although for a time he held a surgical appointment in the Royal Infirmary, his heart was in anatomical work, and he found that to preserve his position in the School it became necessary to give his whole time to the anatomical class. The chair of Anatomy in the University during the period when Dr. Struthers was lecturing in the extra-mural School, was filled by Prof. John Goodsir, a great philosophical anatomist and original investigator. By a strict attention to his duties, by the mastery of detail and a faculty of lucid exposition, Struthers obtained a reputation which attracted students; so that his class became satisfactory as regarded numbers, and his position as a teacher was so well assured, that during Goodsir's illness in the session 1853-54, Struthers was appointed to undertake the duties of the chair of Anatomy.

On his appointment to the chair of Anatomy in Aberdeen in 1863, he found the arrangements for anatomical teaching in that University to be in a crude and backward condition. With the energy and power of steady application, which were so characteristic of the man, he at once set himself to develop the methods of teaching, and to make them worthy of a University course, so that the reputation of the chair was greatly increased, and the number of the students attending the class was more than doubled. He employed both his voice and pen in promoting the raising of funds for the construction of new buildings, in which not only his own, but the other branches of medical study could be properly taught, and he contributed in a very material manner to the prosperity which attended medical and scientific education in the University of Aberdeen.

There can be no doubt that, in carrying out the reforms which he was so instrumental in procuring, he had many hard battles to fight against the prejudices and imperfect conceptions of what was required in the modern teaching of medicine, held by many of his colleagues, more especially in the faculties of arts and theology. It required a man of great determination of character, who knew what was wanted, and would not readily acccept a defeat, to raise to their proper level, and in accordance with the needs of the time, the buildings and materials required for medical and scientific teaching. Although much in addition has been done during the ten years that have elapsed since Struthers retired from the chair, the spirit of improvement which he had been so largely instrumental in developing has continued to grow under the direction of his later colleagues and successors.

This is scarcely the place to dwell on the attention which Sir John Struthers gave to the public relations of his profession. One cannot, however, overlook the fact that he took a great practical interest in the efforts which were made between 1850 and 1886 to promote medical legislation, and to provide for the service of the public a medical practitioner possessing a higher standard than formerly of general and professional education. As representing his University for some years on the General Medical Council, he was most active in the discussions which led to the period of medical education being raised from four to five years before a diploma could be obtained. When, on his retirement from the Aberdeen chair, he went to reside in Edinburgh, he became a manager of the Royal Infirmary in that city, and did good service in developing the means afforded by that great hospital for imparting clinical instruction, more especially in the special departments of medical and surgical practice.

The Royal College of Surgeons of Edinburgh recognised his professional services and his attachment to the College which had granted him, in his early life, his licence to teach, by making him from 1895 to 1897 its president. During this period he devoted much of his time to the reorganisation of the museum of the College, and he contributed to it many valuable anatomical specimens.

Sir John Struthers was a voluminous writer on several branches of anatomical science, although, as he often used to say, the time which he required to devote to teaching, to University business and to the consideration of the public relations of his profession greatly curtailed the hours which he was able to give to research. His most noteworthy investigations, those which probably more than any other of his contributions to science will give him a permanent position in anatomical literature, were his memoirs on the anatomy of the Cetacea, more especially on the Whalebone whales. They were for the most part, if not entirely, printed in the *Journal of Anatomy and Physiology*, and his memoir on the anatomy of the Hump-backed whale, which gives the most detailed account of its skeleton that has yet been published, was subsequently reproduced in a separate volume.

The chief characteristic of his anatomical writings was the minute attention paid to detail. He seemed to spare neither time nor labour in striving to give accuracy to his descriptions, a quality which to an anatomical writer is of fundamental importance. He, however, carried out his love of minute accuracy to such an extent that when he began to record variations in the weight of the clavicle, and expressed in fractions of an inch the diameters of the bodies and processes of the large vertebræ of a great whale, it is not an unfair criticism to make, that so ample a supply of detail is apt to obscure the essential characters of an object. The memoranda which he prepared, and the reports which he wrote on University and other public questions in which he was interested, displayed the same quality of laborious detail; so that we may say of Sir John Struthers, that he possessed an infinite capacity for taking trouble, and that he did work in his day and for his generation.

NOTES.

DR. HELMERT, professor of geodesy in the University of Berlin, and director of the Prussian Geodetic Institute, has been elected a correspondant of the section of geography and navigation of the Paris Academy of Sciences, in succession to Sir G. H. Richards.

A MONUMENT to Pasteur is to be unveiled at Lille on Sunday, April 9. On the same day the Pasteur Institute of Lille will be formally opened. M. Viger, Minister of Agriculture, and M. Guillain, Minister for the Colonies, will preside at the ceremonies.

WE much regret to announce that Sir Douglas Galton, K.C.B., F.R.S., died on Friday last, at seventy-seven years of age.

SIR WILLIAM TURNER, F.R.S., professor of anatomy in the University of Edinburgh, has been elected president of the British Association for the Bradford meeting next year.

The *Lancet* states that the late Prof. Rutherford has bequeathed to Edinburgh University his valuable medical library and his physiological and microscopical specimens and diagrams.

In consequence of the forthcoming international geographical congress at Berlin, the thirteenth German Geographentag, which was to be held at Breslau this Easter, has been postponed until Easter of next year.

Sir Norman Lockyer, K.C.B., has been nominated by the Royal Society to succeed the late Rev. Bartholomew Price as a member of the Board of Visitors of the Royal Observatory, Greenwich.

The third Congrès des Sociétés savantes will be held at Toulouse on April 4.

The next Congress of the South-East Union of Scientific Societies will be held at Rochester on May 25, 26 and 27.

The death is announced of Dr. Wilhelm Hankel, professor of physics in the University of Leipzig.

Major J. Evans, professor of pathology in the Calcutta Medical College, died on Monday from the plague.

The death is announced of Dr. Francis N. Macnamara, formerly professor of chemistry at the Calcutta Medical College, and chemical examiner to the Government of India. Upon his return to England after leaving the Indian Medical Service, he was appointed by the Secretary of State Examiner of Medical Stores at the India Office. He was about to relinquish this appointment when death overtook him, on March 5, at the age of sixty-seven. Dr. Macnamara was the author of a number of works and papers on hygiene and medical chemistry.

In connection with the second International Acetylene Congress, an international exhibition of acetylene gas will be held in Budapest in May next, when gold and silver medals will be awarded.

We learn that the physics garden of the Society of Apothecaries in Chelsea, founded by Sir Hans Sloane in 1722, is about to enter upon a new period of activity and usefulness. A physiological laboratory is to be built, a scientific curator appointed, and courses of lectures on different branches of botany are to be given.

It is stated in the *British Medical Journal* that a laboratory for the application of the Röntgen rays has recently been opened in Madrid, under the name of Instituto Radiografico de Españo. The Institute, the installation and equipment of which are on a magnificent scale, is said to have cost some two million pesetas (80,000*l.*). It is reported that the impression produced by the size of the place, the luxurious manner in which it is fitted up, and the wealth of apparatus which it contains, on the large assembly of medical men and journalists who were present at the opening, was one akin to stupefaction. The director of the Institute is Dr. Mezquita.

It is announced in the *Electrician* that E. P. Kaüffer, a member of the Verein Deutscher Ingénieure, who died in 1897, left this society a legacy, from which a first prize of 3000 marks, and a second of 1500 marks (about 150*l.* and 75*l.* respectively) are to be awarded for the best essay in reply to the question: "What practical and useful processes are available to transform heat directly (without motors) into electro-dynamical energy?" Herr Bissinger, Prof. Borchers, Prof. Dietrich, Herr Kapp and Dr. Kohlrausch have been chosen as judges. The competition is international, and is not confined to members of the Verein. Essays are to be written in German, and must be sent in before December 31, 1899, to the Verein Deutscher Ingénieure, 43 Charlottenstrasse, Berlin, N.W.

The St. Petersburg correspondent of the *Times* reports that the Russian Geographical Society is fitting out, with the aid of funds supplied by the Tsar, a new expedition for the exploration of Central Asia. The expedition, the work of which is intended to cover two years, is to be under the command of Lieutenant Koslow, and will leave St. Petersburg at the end of the present month. It will make its way through West Mongolia and the Desert of Gobi, will cross the Nan-shan Mountains by Lake Koko-nor, and penetrate into the region lying round the upper waters of the Yellow River.

The Department of Science and Art has received through the Foreign Office a communication from the Director of the Commercial Museum, Philadelphia, calling attention to a Universal Commercial Congress and Exposition to be held there, under its auspices, during the autumn of the present year. There is being erected for the purposes of the Exposition a series of buildings in which will be displayed such American manufactures as are most representative and best adapted to foreign requirements; but it is intended also to accept as exhibits similar articles from European manufacturers, in order to afford an opportunity for a thorough and comparative study of the world's industries. The Congress will be presided over by the President of the United States at the opening Session on October 10, and all nations will have an opportunity of being represented, and having a voice and vote in its deliberations, through duly accredited delegates sent by the various Governments and commercial organisations.

A new incandescent lamp, in which a filament consisting of the carbide of silicon, coated with silicon and carbon by means of a modification of the usual flashing process, has been invented by Herr Langhans. Particulars of the process of manufacture are given in the *Electrician*, from which we learn that owing to the refractory nature of the material used for the filaments, lamps thus made will stand being run at a higher efficiency than is possible with any carbon filament. As is only too well known by users of the glow lamp, its two great faults, which become more marked with every increase in the efficiency when *new*, are falling off in the light and the blackening of the bulbs as time goes on. Both these faults, notwithstanding the high efficiency, are said to be practically absent from the carbide of silicon lamp. It is claimed that the new lamp, starting at an efficiency of 2·8 watts per amyl-acetate candle (*i.e.* about 3·1 watts per English candle), will run from 600 to 800 hours without any material decrease in the light emitted, increase in the watts consumed per candle, or any blackening of the glass bulbs. So that, apart from the gain in appearance and comfort from the lamps remaining bright and clean, the user of this lamp should save, on this estimate, some 25 per cent. on his lighting bills, as compared with the expenses of the use of the ordinary carbon filament lamp.

The *Proceedings* of the Swedish Academy of Science, vol. xxxi., contains a discussion of the mean atmospheric pressure in Sweden for the years 1860–1895, by Dr. H. E. Hamberg. The work forms one of a series of valuable papers by the Meteorological Office at Stockholm, in commemoration of its twenty-fifth anniversary, and includes both tables of monthly and yearly mean values for thirty-four stations, and mean isobaric charts for the same periods. An examination of the annual variation shows that there are no less than four maxima and four minima. The first maximum, that of mid-winter, occurs in January and February, and is most pronounced in the south of Sweden. It is produced by the deviation of the Asiatic high-pressure, which extends over parts of Europe. The second maximum occurs in spring, and is most marked in the north; it is apparently caused by the polar anticyclone, in conjunction with the high pressure over part of the North Atlantic. The subsidiary maxima occur in September and November. The first minimum occurs in March, and is very marked. It appears to be due to the low pressure over the Atlantic, and to the diminution of the continental anticyclones. The second, or summer minimum, occurs in July and August. It is caused by cyclonic formations developed by the high temperature over Europe and Asia. The subsidiary minima occur in October and December.

IN the *Indian Meteorological Memoirs*, vol. vi. part iv., Mr. J. Eliot, F.R.S., discusses the occurrence and distribution of hailstorms in India during the fifteen years 1883–97. Information of all important hailstorms is collected by the revenue authorities, with the view of remitting the collection of part or the whole of the land tax over the affected areas, and Mr. Eliot has wisely arranged for copies of the data to be supplied to the Indian Meteorological Office. In the very interesting discussion, he points out that 94 per cent. of the hailstorms occur during the north-east, or dry monsoon (December to May), when the diurnal range of temperature is large, and that they are almost entirely absent during the south-west, or wet monsoon (June to November). A noteworthy feature of the distribution is that in certain districts the storms occur chiefly during the first part of the dry monsoon, *i.e.* during the cold weather season, while in other provinces they originate chiefly during the hot weather. As regards the diurnal distribution, during the hot weather period the hailstorms occur chiefly (about 74 per cent. of the total number) between 3 p.m. and 8 p.m. In the cold weather season, they are most frequent during the hottest time of the day, 3 p.m. to 4 p.m.

WE are glad to learn from a Report, just published, that the stimulus supplied by the visit of the British Association to Bristol last year, and the special efforts made by the Committee, have resulted in increased interest being taken in the Bristol Museum, one consequence of which has been a succession of valuable gifts to the collections. In April 1898 an important discovery of animal remains belonging to the Pleistocene period was made at Uphill, near Weston-super-Mare. Steps were at once taken by the Committee to secure for the museum collections the results of an exploration of the site. The exploration was carried on as far as was possible at the time, and the result has been that a large and representative collection of the bones and teeth of animals, including those of the hyena, mammoth, horse, cave-bear, cave-lion, rhinoceros, fox, &c., has been secured. Peculiar interest attaches to certain other bone fragments that have been identified as those of man, and to a small collection of chipped flints and rounded stones. A selection from these interesting objects was exhibited by the present curator, Mr. Herbert Bolton, at the British Association, and he also communicated the substance of the notes on the subject of the exploration, left by his predecessor, Mr. E. Wilson. The Council of the Association have shown their interest in the matter by making a grant of £30—towards any further expense, and the Chairman of the Committee (Mr. W. R. Barker) and Mr. Bolton are now associated with Prof. C. Lloyd Morgan, Prof. W. Boyd Dawkins, and others, in determining what further can be done.

THE Hayti earthquake of December 29, 1897, is the subject of an interesting paper, by Dr. G. Agamennone, in the last *Bollettino* of the Italian Seismological Society. The epicentre was situated in the valley of the river Yaque, in lat. 19½° N. and long. 71° W., and the intensity in this district was from 9 to 10 of the Rossi-Forel scale. The total disturbed area was not less than 125,000 square km.; but, as usual, the seismic waves were recorded by pendulums in distant observatories, the furthest being that of Nicolaiew, 9370 km. from the origin. The earlier tremors travelled with a velocity of about 10 km. a second, and the subsequent slow pulsations with a velocity of about 3 km. a second. The estimates of the period of the latter vary with the instrument employed, ranging from seven seconds at Rocca di Papa, near Rome, to eighteen seconds at Catania.

WE have received the first instalment of a "Catalogue of the Types and Figured Specimens in the Palæontological Collection of the Geological Department, American Museum of Natural History," issued as vol. xi. part 1 of the *Bulletins* of that Museum. The importance of the proper cataloguing of type-specimens of fossils needs no pointing out, and the work before us, prepared by Mr. R. P. Whitfield, assisted by Mr. E. O. Hovey, is a model of clear and careful arrangement. The specimens are arranged firstly according to geological systems, secondly in biological classes, and then alphabetically. Generic names appear in Clarendon type, species in Roman, and synonyms in italics. The catalogue is arranged in seven columns, stating in turn (1) the geological series (initials only); (2) catalogue number; (3) whether "type" or "figured"; (4) genus, species, and author; (5) reference—subdivided into five columns for work, volume, page, plate, and figure; (6) locality; and (7) remarks. The only improvement that we would suggest is the printing of the name of the geological system on *every* page, instead of only once. The present part covers the Cambrian and Lower-Silurian systems.

THE third instalment of the International Geological Map of Europe, which has recently been issued, is specially interesting to British geologists from its containing the three sheets that cover the British Isles (A4, B3, and B4). For the sake of symmetry, sheet A3 is added, but this resembles a certain famous map in "representing the sea without the least vestige of land"; while A4 contains such a small fragment of Ireland that the margin of B4 has been broken, and the fragment repeated there, the two sheets B3 and B4 thus including the whole of the islands. The British Isles, treated from the international point of view, present a somewhat unfamiliar aspect. This is due not so much to violet Trias and blue Jurassic as to the representation of Drift. Ireland, in particular, is one mass of stripes, indicating known older strata covered by quaternary. As no allowance is made in the Index of Colours for non-metamorphic pre-Cambrian beds, the Longmynd and Charnwood Forest have perforce to reappear as "Cambrian"; but the insertion of such comparative novelties as the Permian of Devonshire, and the Cambrian of the north-west Highlands clears the map of any suspicion of being out of date. Besides the British sheets the new issue includes C5, which forms by itself an excellent map of the Alps, and D5 and D6, which take in most of Austria-Hungary, the Balkan peninsula and Greece.

AT the Institution of Civil Engineers on March 7, two papers relating to recent advances in marine engineering were read. The first paper, on "Water-Tube Boilers for Marine Engines," by Mr. J. T. Milton, consisted mainly of a description of the various types of water-tube boilers most in use for marine purposes in this country. For all recent vessels of the Royal Navy water-tube boilers of dfferent type had been adopted, while very few had been fitted in merchant steamers. The second paper, on "Machinery of Warships," by Sir A. J. Durston, K.C.B., and Mr. H. J. Oram, R.N., gave particulars and remarks on the construction of warship machinery and details of the results obtained since the date of the paper read at the Institution in November 1894. It was pointed out that further experience with water-tube boilers had led to their general adoption for warships. In considering the type most suitable, the principal points to be considered were weight and space required, economy and durability. On account of the last two considerations, boilers of the large-tube type had been adopted for the larger vessels. The Belleville boiler was fitted in these vessels, and in recent cases these had been fitted with economisers, the number of tubes in the generators being reduced. Trials on shore showed 12 to 15 per cent. increase of economy due to the use of these economisers. In the smaller fast vessels, to reduce weight, boilers of the small-tube type were generally fitted. Experience had shown that the ordinary life of the tubes of the Belleville boiler, under ordinary circumstances, would be not less than two commissions. In small-tube boilers this life would generally be much less. Zinc slabs, though still of use in arresting corrosion, could not from the nature of construction of water-tube boilers be so effective as in water-tank boilers. The parts of the boiler near the feed-water inlet appeared to be very subject to corrosion, and this appeared to be due to the liberation of air and other gases from the feed-water at this part. It was endeavoured to minimise this action by using distilled water whenever possible.

MR. E. F. J. LOVE has drawn up, for the Sydney session of the Australian Association for the Advancement of Science, a report on our knowledge of the thermodynamics of the voltaic cell. In it the author shows how the general laws of thermodynamics have been applied to the determination of electromotive force, Helmholtz's law, the Peltier effect, dissociation, the calculation of the free energy of the current, polarisation, and the relation between electromotive force and external pressure. It is pointed out that the results here exhibited as deductions from the laws of thermodynamics can in some cases be obtained independently by totally different methods.

AN extremely interesting and suggestive memoir, dealing with some investigations on the bacterial diseases of plants, has been contributed by M. Émile Laurent to the *Annales de l'Institut Pasteur*. The majority of the experiments were made with potatoes, cultivating them on soil variously treated with manures, chemical and other, and then inoculating the tubercles with a certain micro-organism closely allied to the *B. coli communis* obtained from the air during the course of the investigations. Different kinds of potatoes were selected, and, as was to be expected, the various chemical manures employed affected the luxuriance of the growth very differently; but the chief interest of these experiments lies in the fact that apparently susceptibility to bacterial infection varies not only with the variety of potato, but also according to its conditions of cultivation. Thus the bacterial susceptibility of several varieties was increased by their being grown on land liberally treated with lime. According to M. Laurent, speaking generally, lime added to soil increases the susceptibility of potatoes to bacterial infection, and nitrogenous and potash manures have the same effect, only to a less extent; whilst the addition of phosphates distinctly diminishes this susceptibility, as also does common salt, only not so markedly. Some interesting experiments are recorded, showing how the virulence of this bacillus towards potatoes can be artificially increased by suitable conditions of cultivation. Incidentally, we are told that the typhoid bacillus attacks potatoes with extraordinary energy if the resistance of the latter has been reduced by treatment with an alkaline solution; this activity of the typhoid bacillus being more marked than was the case with other varieties of bacteria which had had a far longer training. The memoir is replete with suggestive work, and affords a fresh outlet for the energies of those bacteriologists who care to study the micro-organisms in their relation to plant-life.

THE February number of the *Quarterly Journal of Microscopical Science* is almost entirely devoted to Dr. Arthur Dendy's very interesting memoir on the development of the Tuatara (*Sphenodon punctatus*).

MESSRS. WILLIAMS AND NORGATE have just issued No. 70 of their Book Circular (Scientific Series), in which is to be found notes on, and the titles of, numerous new and forthcoming publications in all branches of science.

WE are glad to learn that owing to the fact that the circulation of *Science Abstracts* now exceeds 4000 copies monthly, the price is to be reduced from three to two shillings per copy. Mr. W. R. Cooper has been promoted from assistant editor to editor, and the *Abstracts* are now published by Messrs. E. and F. N. Spon.

THE *Journal of Applied Microscopy*, published monthly by the Bausch and Lomb Optical Company, Rochester, N.Y., has now entered on the second year of its existence, and continues to supply useful practical notes to microscopists on microtechnique, the preparation of microscopical objects, and other kindred subjects.

FROM the Michigan State Agricultural College, we have received *Bulletins* Nos. 164 and 165 of the Farm Department:—Methods and results of tillage, and draft of farm implements, by M. W. Fulton; also *Bulletins* Nos. 5 and 6 of the Botanical Department:—Branches of sugar-maple and beech as seen in winter; and potatoes, ruta-bagas, and onions, by W. J. Beal.

SOME hydroids collected in Puget Sound are described and illustrated by Mr. G. N. Calkins in the *Proceedings* of the Boston Society of Natural History. The area examined was comparatively small, two points—Port Townsend and Bremerton—being the only localities represented in the collection. These two places, however, yielded no less than thirty species, a fact which promises well for the further investigation at different points on the Sound.

AN addition (No. 24) to the series of "Museum Handbooks," published in connection with the Museum of Owens College, Manchester, has been made by the publication of reprints from the *Journal of Conchology* of papers by Messrs. J. Cosmo Melville and Robert Standen, on the marine mollusca of Madras, and on marine shells from Lively Island, Falklands. This handbook is illustrated by two plates, one of which consists of a photographic reproduction of *Trophon geversianus*, from a specimen in the possession of Mr. Cosmo Melville.

LORD DELAMERE, during his recent expedition into East Equatorial Africa, made a valuable collection of zoological specimens, some of which he is presenting to the Natural History Museum. He succeeded in taking a series of photographs of most of the representative animals met with, including elephants, giraffes, zebras, antelopes, gazelles, &c. As the pictures show the characters of the country as well as the natural features and positions of the animals in their wild state, they are of scientific interest. They will be included in a volume entitled "Great and Small Game of Africa," to be published shortly by Mr. Rowland Ward.

IN the February number of the *Bulletin de la Société d'Encouragement pour l'Industrie Nationale* is an interesting summary by Prof. Grehant of his researches on the products of combustion of lighting gas under different conditions. He has specially studied the formation of carbon monoxide, on account of the deleterious action upon the health of small traces of this poisonous gas. Two methods were independently employed for this purpose, one physiological, depending upon the analysis of the gas extracted from the blood of animals who had been breathing the vitiated air, and the other purely chemical, depending upon the reduction of iodic anhydride at

150° C. by traces of carbon monoxide. In an ordinary bats-wing burner, the amounts of carbon monoxide found were so small as to be possibly due to experimental error, and in any case negligible. The ordinary incandescent burner gives off traces of this gas, and in fact whenever a gas flame strikes an obstacle within a certain distance of the orifice through which the gas is issuing, small quantities of carbon monoxide are evolved, and on this account special attention to the upward draught in all gas stoves is essential. No lighting burner in ordinary use appears to give off sufficient carbon monoxide to render any special precautions necessary, the author pointing out that more of this gas will be introduced into a room through slightly defective gas fittings than is given out by any pattern of burner in ordinary use.

THE additions to the Zoological Society's Gardens during the past week include a Macaque Monkey (*Macacus cynomolgus*) from India, presented by Mr. W. White; two Great Bats (*Vespertilio noctula*), British, presented by Mr. E. Hilton; a Common Seal (*Phoca vitulina*) from the River Spay, Scotland, presented by his Grace the Duke of Richmond and Gordon, K.G.; a Common Hare (*Lepus europaeus*), British, presented by Miss Henrietta Holland; an Egyptian Jerboa (*Dipus aegyptius*) from North Africa, presented by Mr. F. Tomlin; a West African Love Bird (*Agapornis pullaria*) from West Africa, presented by Mr. C. W. Gameys; a Kiang (*Equus hemionus*) from Tibet, a Rose-crested Cockatoo (*Cacatua moluccensus*) from Moluccas, an Echidna (*Echidna hystrix*) from New South Wales, deposited; a Cabot's Tragopan (*Ceriornis caboti*) from China, five Crested Colins (*Eupsychortyx cristata*) from Mexico, purchased.

OUR ASTRONOMICAL COLUMN.

COMET 1899 *a* (SWIFT).—The number of observations of this comet has been sufficient to allow of the orbit being computed, and for this the following elements are found:—

T = 1899, April 13·26, G.M.T.

$$\left.\begin{array}{rcrr} & & ^{\circ} & ' \\ \omega & = & 4 & 54 \\ \Omega & = & 23 & 9 \\ i & = & 146 & 4 \\ q & = & 0·3447 & \end{array}\right\} 1899$$

Ephemeris for 12h. G.M.T.

1899.	R.A. h. m.	Decl. ° ′	Br.
Mar. 16	2 56	11 53	1·00
17	2 52	−10 47	1·13
19	2 46	8 47	
20	2 43	7 55	
21	2 40	6 54	1·23
23	2 34	5 7	

The comet is brightening as it approaches the sun, and its rapidly decreasing southerly declination will render its observation more likely in these latitudes. It is said to be round, with a diameter of about 7′ of arc, having a central condensation and a short tail. It should be looked for immediately after sunset near η Eridani, and will move from that position towards the variable star o Ceti (Mira).

TUTTLE'S COMET 1896 *b*.—In *Ast. Nach.*, 3552, Mr. J. Rahts gives an improved ephemeris of this comet, together with the elements.

1899.	R.A. h. m.	Decl. ° ′
March 17	2 2	+28 49
21	2 18	27 42
25	2 33	26 30
29	2 48	+25 13

The comet is increasing in brightness.

NEW STAR IN AQUILA.—A circular from the Centralstelle at Kiel informs us of the present state of the new star discovered by Mrs. Fleming in March 1898, during the examination of the Harvard plates. The position of the star for epoch 1900 is R.A. = 18h. 56m. 13s.; Decl. = −13° 18′; this place is in the south-western border of Aquila, or on some charts in the north-west of Sagittarius. At the time of discovery the Nova was of the fifth magnitude, while now (March 10) Prof. Pickering gives it the magnitude ten, as determined from the photometric measurement of eight plates.

PHOTOGRAPHY OF CORONA.—For the past four or five years several astrophysicists have been attempting to obtain photographs of the Solar Corona without the aid of a total eclipse, but so far, however, without success. Sig. A. Ricco, director of the Catania Observatory, gives the history of the investigation as well as the results of his own attempts on the problem. [*Bulletin de la Soc.-Belgé d'Astronomie*, vol. iii. No. 4.] The first attempts described are those of Dr. Huggins, who employed a reflector having an extended cap provided with numerous diaphragms to minimise the amount of scattered light. A similar apparatus has also been used by A. Mascari at the observatory on Mount Etna. Certain corona-like forms do appear on the photographs thus obtained, but there seems to be no probability of their being real.

Later Prof. G. E. Hale, using a spectroheliograph at Mount Etna, attempted to photograph the corona by isolating the violet calcium line (K) of the spectrum, and traversing the sun's image given by a lens across the slit of the instrument. This was also unsuccessful.

Prof. Ricco then tried using a portrait lens, but with no better result; and the last attempts he describes were made with pin-hole cameras of various dimensions, these also failing to record any true image. Reproductions of the photographs obtained with all four types of apparatus are given, and examination of these shows that the only appearance photographed is the graduated halation effect radiating equally in all directions from the solar disc.

HARVARD COLLEGE OBSERVATORY.—In the Harvard College Observatory *Circular*, No. 39, Prof. E. C. Pickering presents some remarks on the work done with the new Bruce photographic doublet in comparison with other instruments of different design. He advocates that in future new large telescopes should be made of widely-varying types, so that the most appropriate form for any particular department of astronomical work may be obtained. The Bruce telescope was a new departure from conventional lines, and its complete success encourages the extension of the inquiry. In this case the instrument has a very short focal length, and Prof. Pickering proposes, if funds be forthcoming, to design an instrument of unusually long focus, say from 130 to 160 feet, with an aperture of from 12 to 14 inches. This he would place horizontally, and feed with light from a mirror. The diurnal motion would be counteracted by moving the plate by clockwork, as in the horizontal photo-heliograph now in use at Cambridge. With such an instrument he thinks much could be done in obtaining better photographs of the solar surface and the prominences; pictures of the moon could be got exceeding 12 inches in diameter without enlargement, and possibly photographs of the planets Jupiter, Saturn and Mars. It would also be useful in re-determining the solar parallax from the next approach of Eros in 1900, by observing the planet east and west of the meridian.

Circular No. 40 gives a description of the methods adopted at the observatory for photographing meteors. In the case of determining the radiant point of bright meteors the usual method of intersecting trails is scarcely applicable, their number being so small. If, however, the meteor is simultaneously observed from *two* stations, the radiant can be determined just as correctly. Provision for this has been made, cameras provided with automatic exposing shutters having been installed at Blue Hill and Cambridge. The lenses are of wide angle, and point to the zenith. If two photographs of the same meteor are superimposed, the height at the instant of exposure can be found by a simple proportion. As the distance of the meteor on the two photographs is to the focal length of the lenses, so is the distance apart of the two stations to the required altitude. The positions of the trails in space can be found if stars are also photographed on the plates, the intersection of the two trails giving the declination of the radiant point of the meteor. The right ascension is, however, indeterminate unless time of appearance is known, or, as may be later, the camera be mounted equatorially.